

WHAT IS CLAIMED IS:

1. A method for analyzing tissue based on quantized magnetic resonance data comprising the steps of

- a) selecting at least one magnetic resonance parameter to characterize a body part, organ or tissue,
- b) selecting a suitable pulse sequence to quantify that selected magnetic resonance parameter,
- c) using the selected pulse sequence to acquire multiple sets of magnetic resonance signals from the body part, organ or tissue at an unchanged position relative to the measurement acquisition system,
- d) quantifying the magnetic resonance imaging parameters on a pixel by pixel basis,
- e) determining biological properties of interest of a body part, organ or tissue structure by biological means including histological, biochemical, histochemical, and biomechanical,
- f) correlating quantitative ranges of the selected magnetic resonance parameters with selected biological properties of interest of a body part, organ or tissue.

2. The method as defined by claim 1 wherein in step a) the magnetic resonance parameter is selected from longitudinal relaxation time (T_1), transverse relaxation time (T_2), magnetization transfer (MT), and magnetization ratio (MR).

3. The method as defined by claim 2 wherein the tissue is cartilage.

4. The method as defined by claim 3 and further including the step of:
d) creating an image of the tissue based on representation of sets of one or more quantitative magnetic resonance parameters.

5. The method as defined by claim 1 and further including the step of:
f) creating an image based on representation of sets of one or more quantitative magnetic resonance parameters.

6. A method for analyzing tissue based on quantized magnetic resonance data comprising the steps of

- a) acquiring magnetic resonance signals from the tissue,

- 4 b) determining at least one magnetic resonance quality of tissue in each
5 pixel,
6 c) quantizing the magnetic resonance signals pixel by pixel within the
7 tissue, and
8 d) correlating the determined magnetic resonance quality with known
9 magnetic resonance qualities of tissue.

1 *Sub 7* 7. The method as defined by claim 6 wherein in step c) the magnetic
2 resonance quality is selected from longitudinal relaxation time (T_1), transverse relaxation
3 time (T_2), magnetization transfer (MT), and magnetization ratio (MR).

1 8. The method as defined by claim 7 wherein the tissue is cartilage.

1 *Sub A3* 9. The method as defined by claim 8 and further including the step of:
2 d) creating an image of the tissue based on the determined magnetic
3 resonance quality.

1 10. The method as defined by claim 6 and further including the step of:
2 d) creating an image of the tissue based on the determined magnetic
3 resonance quality.

1 11. Magnetic resonance apparatus for use in analyzing a body comprising:
2 a) means for establishing a magnetic field through the body,
3 b) means for exciting nuclei spins in the body with an RF signal oriented
4 at an angle with respect to said magnetic field,
5 c) means for receiving magnetic resonance signals from the excited
6 nuclei representative of said nuclei spins,
7 d) repeating steps b) and c) to obtain a multiplicity of sets of magnetic
8 resonance signals and determining a magnetic resonance quality from the body, and
9 e) means for quantizing the magnetic resonance quality pixel by pixel
10 within the body.

1 *Sub B1* 12. Apparatus as defined by claim 11 wherein the magnetic resonance
2 quality is T_2 relaxation time.

1 13. Apparatus as defined by claim 12 wherein steps b), c), and d) are pulse
2 echo sequences with varying echo times.

1 14. Apparatus as defined by claim 11 wherein the magnetic resonance
2 quality is chosen from T1 relaxation time, T2 relaxation time, and magnetic ratio.

1 15. Apparatus as defined by claim 11 and further including
2 f) a display for imaging the magnetic resonance qualities pixel by pixel.

add AS

09828070-040501